

CLAIMS

WHAT IS CLAIMED IS:

1. A valve assembly comprising:
 - a first check valve structured to permit fluid flow therethrough in response to application of positive pressure at an inlet of said first check valve, further comprising an outlet of said first check valve being in fluid communication with at least a portion of a fluid system;
 - a second check valve having an outlet in fluid communication with said inlet of said first check valve, said second check valve being structured to permit fluid flow therethrough in response to application of negative pressure at said outlet of said second check valve; and,
 - an inlet/outlet port in fluid communication with said inlet of said first check valve and said outlet of said second check valve at a common refill/evacuation location.
2. The valve assembly of Claim 1, wherein said fluid system portion includes at least a pre-filter portion.
3. The valve assembly of Claim 2, further comprising said pre-filter portion of said fluid system being in fluid communication with at least one fluid filter.
4. The valve assembly of Claim 1, further comprising said second check valve being in fluid communication with at least one fluid reservoir.

5. The valve assembly of Claim 1, further comprising at least one quick disconnect connection operatively associated with said inlet/outlet port.
6. The valve assembly of Claim 1, further comprising at least one fluid component in fluid communication with said inlet/outlet port.
7. A valve system comprising:
 - a first valve assembly comprising,
 - a first check valve structured to permit fluid flow therethrough in response to application of positive pressure at an inlet of said first check valve, further comprising an outlet of said first check valve being in fluid communication with a first portion of a fluid system;
 - a second check valve having an outlet in fluid communication with said inlet of said first check valve, said second check valve being structured to permit fluid flow therethrough in response to application of negative pressure at said outlet of said second check valve;
 - a first inlet/outlet port in fluid communication with said inlet of said first check valve and said outlet of said second check valve at a first common refill/evacuation location;
 - a second valve assembly comprising,
 - a third check valve structured to permit fluid flow therethrough in response to application of positive pressure at an inlet of said third check valve, further

comprising an outlet of said third check valve being in fluid communication with a second portion of a fluid system;

a fourth check valve having an outlet in fluid communication with said inlet of said third check valve, said fourth check valve being structured to permit fluid flow therethrough in response to application of negative pressure at said outlet of said fourth check valve; and,

a second inlet/outlet port in fluid communication with said inlet of said third check valve and said outlet of said fourth check valve at a second common refill/evacuation location.

8. The valve system of Claim 7, wherein at least one of said first portion of a fluid system and said second portion of a fluid system includes at least a pre-filter portion.

9. The valve system of Claim 8, further comprising said pre-filter portion being in fluid communication with at least one fluid filter.

10. The valve system of Claim 7, further comprising at least one of said second check valve and said fourth check valve being in fluid communication with at least one fluid reservoir.

11. The valve system of Claim 7, further comprising at least one quick disconnect connection operatively associated with at least one of said first inlet/outlet port and said second inlet/outlet port.

12. The valve system of Claim 7, further comprising at least one fluid component in fluid communication with at least one of said inlet/outlet ports.

13. The valve system of Claim 7, further comprising:

at least a third valve assembly comprising,

a fifth check valve structured to permit fluid flow therethrough in response to application of positive pressure at an inlet of said fifth check valve, further comprising an outlet of said fifth check valve being in fluid communication with a third portion of a fluid system;

a sixth check valve having an outlet in fluid communication with said inlet of said fifth check valve, said sixth check valve being structured to permit fluid flow therethrough in response to application of negative pressure at said outlet of said sixth check valve; and,

a third inlet/outlet port in fluid communication with said inlet of said fifth check valve and said outlet of said sixth check valve at a third common refill/evacuation location.

14. The valve system of Claim 13, wherein at least one of said first portion of a fluid system, said second portion of a fluid system, and said third portion of a fluid system includes at least a pre-filter portion.

15. The valve system of Claim 14, further comprising said pre-filter portion being in fluid communication with at least one fluid filter.
16. The valve system of Claim 13, further comprising at least one of said second, fourth and sixth check valves being in fluid communication with at least one fluid reservoir.
17. The valve system of Claim 13, further comprising at least one quick disconnect connection operatively associated with at least one of said inlet/outlet ports.
18. The valve system of Claim 13, further comprising at least one fluid component in fluid communication with at least one of said inlet/outlet ports.
19. A valve assembly comprising:
 - a first electronic valve structured to permit fluid flow therethrough in response to sensing application of positive pressure at an inlet of said first electronic valve, further comprising an outlet of said first electronic valve being in fluid communication with a first portion of a fluid system;
 - a second electronic valve having an outlet in fluid communication with said inlet of said first electronic valve, said second electronic valve being structured to permit fluid flow therethrough in response to sensing application of negative pressure at said outlet of said electronic check valve; and,

an inlet/outlet port in fluid communication with said inlet of said first electronic valve and said outlet of said second electronic valve at a common refill/evacuation location.

20. The valve assembly of Claim 19, wherein said first portion of a fluid system includes at least a pre-filter portion.

21. The valve assembly of Claim 20, further comprising said pre-filter portion being in fluid communication with at least one fluid filter.

22. The valve assembly of Claim 19, further comprising said second electronic valve being in fluid communication with at least one fluid reservoir.

23. The valve assembly of Claim 19, further comprising at least one quick disconnect connection operatively associated with said inlet/outlet port.

24. The valve assembly of Claim 19, further comprising at least one fluid component in fluid communication with said inlet/outlet port.

25. The valve assembly of Claim 19, further comprising a control module operatively associated with at least one of said first and second electronic valves.

26. The valve assembly of Claim 19, further comprising at least one sensor operatively associated with a control module and at least one of said first and second electronic valves.

27. The valve assembly of Claim 26, further comprising said control module being configured for recording at least one of a date and a time in association with actuation of at least one of said valves.

28. A valve system comprising:

a first electronic valve assembly comprising,

a first electronic valve structured to permit fluid flow therethrough in response to sensing application of positive pressure at an inlet of said first electronic valve, further comprising an outlet of said first electronic valve being in fluid communication with a first portion of a fluid system;

a second electronic valve having an outlet in fluid communication with said inlet of said first electronic valve, said second electronic valve being structured to permit fluid flow therethrough in response to sensing application of negative pressure at said outlet of said electronic check valve;

a first inlet/outlet port in fluid communication with said inlet of said first electronic valve and said outlet of said second electronic valve at a first common refill/evacuation location;

at least a second electronic valve assembly comprising,

a third electronic valve structured to permit fluid flow therethrough in response to sensing application of positive pressure at an inlet of said third electronic valve, further comprising an outlet of said third electronic valve being in fluid communication with a second portion of a fluid system;

a fourth electronic valve having an outlet in fluid communication with said inlet of said third electronic valve, said fourth electronic valve being structured to permit fluid flow therethrough in response to sensing application of negative pressure at said outlet of said fourth electronic check valve; and,

a second inlet/outlet port in fluid communication with said inlet of said third electronic valve and said outlet of said fourth electronic valve at a second common refill/evacuation location.

29. The valve system of Claim 28, wherein at least one of said first portion of a fluid system and said second portion of a fluid system includes at least a pre-filter portion.

30. The valve system of Claim 29, further comprising said pre-filter portion being in fluid communication with at least one fluid filter.

31. The valve system of Claim 28, further comprising at least one of said second and fourth electronic valves being in fluid communication with at least one fluid reservoir.

32. The valve system of Claim 28, further comprising at least one quick disconnect connection operatively associated with at least one of said inlet/outlet ports.

33. The valve system of Claim 28, further comprising at least one fluid component in fluid communication with at least one of said inlet/outlet ports.

34. The valve system of Claim 28, further comprising a control module operatively associated with at least one of said electronic valves.

35. The valve system of Claim 28, further comprising at least one sensor operatively associated with a control module and at least one of said electronic valves.

36. The valve system of Claim 35, further comprising said control module being configured to record at least one of a date and a time in association with actuation of at least one of said valves.

37. A module comprising:

a first valve assembly comprising,

a first check valve structured to permit fluid flow therethrough in response to application of positive pressure at an inlet of said first check valve, further comprising an outlet of said first check valve being in fluid communication with a first portion of a fluid system;

a second check valve having an outlet in fluid communication with said inlet of said first check valve, said second check valve being structured to permit fluid flow therethrough in response to application of negative pressure at said outlet of said second check valve;

a first inlet/outlet port in fluid communication with said inlet of said first check valve and said outlet of said second check valve at a first common refill/evacuation location;

at least a second valve assembly comprising,

a third check valve structured to permit fluid flow therethrough in response to application of positive pressure at an inlet of said third check valve, further comprising an outlet of said third check valve being in fluid communication with a second portion of a fluid system;

a fourth check valve having an outlet in fluid communication with said inlet of said third check valve, said fourth check valve being structured to permit fluid flow therethrough in response to application of negative pressure at said outlet of said fourth check valve;

a second inlet/outlet port in fluid communication with said inlet of said third check valve and said outlet of said fourth check valve at a second common refill/evacuation location; and,

said first and second valve assemblies being coupled together to form said module.

38. The module of Claim 37, wherein at least one of said first portion of a fluid system and said second portion of a fluid system includes at least a pre-filter portion.
39. The module of Claim 38, further comprising said pre-filter portion being in fluid communication with at least one fluid filter.
40. The module of Claim 37, further comprising at least one of said second check valve and said fourth check valve being in fluid communication with at least one fluid reservoir.
41. The module of Claim 37, further comprising at least one quick disconnect connection operatively associated with at least one of said inlet/outlet ports.
42. The module of Claim 37, wherein at least one of said check valves comprises a cartridge type check valve.
43. The module of Claim 37, wherein at least one of said check valves is structured to be threadedly received into at least one of said assemblies.
44. The module of Claim 37, further comprising at least one fluid component in fluid communication with at least one of said inlet/outlet ports.
45. A module comprising:

a first electronic valve assembly comprising,

a first electronic valve structured to permit fluid flow therethrough in response to sensing application of positive pressure at an inlet of said first electronic valve, further comprising an outlet of said first electronic valve being in fluid communication with a first portion of a fluid system;

a second electronic valve having an outlet in fluid communication with said inlet of said first electronic valve, said second electronic valve being structured to permit fluid flow therethrough in response to sensing application of negative pressure at said outlet of said electronic check valve;

a first inlet/outlet port in fluid communication with said inlet of said first electronic valve and said outlet of said second electronic valve at a first common refill/evacuation location;

at least a second electronic valve assembly comprising,

a third electronic valve structured to permit fluid flow therethrough in response to sensing application of positive pressure at an inlet of said third electronic valve, further comprising an outlet of said third electronic valve being in fluid communication with a second portion of a fluid system;

a fourth electronic valve having an outlet in fluid communication with said inlet of said third electronic valve, said fourth electronic valve being structured to permit fluid flow therethrough in response to sensing application of negative pressure at said outlet of said fourth electronic check valve;

a second inlet/outlet port in fluid communication with said inlet of said third electronic valve and said outlet of said fourth electronic valve at a second common refill/evacuation location; and,

said first and second electronic valve assemblies being coupled together to form said module.

46. The module of Claim 45, wherein at least one of said first portion of a fluid system and said second portion of a fluid system includes at least a pre-filter portion.

47. The module of Claim 46, further comprising said pre-filter portion being in fluid communication with at least one fluid filter.

48. The module of Claim 45, further comprising at least one of said second and fourth electronic valves being in fluid communication with at least one fluid reservoir.

49. The module of Claim 45, further comprising at least one quick disconnect connection operatively associated with at least one of said inlet/outlet ports.

50. The module of Claim 45, further comprising at least one fluid component in fluid communication with at least one of said inlet/outlet ports.

51. The module of Claim 45, further comprising a control module operatively associated with at least one of said electronic valves.

52. The module of Claim 45, further comprising at least one sensor operatively associated with a control module and at least one of said electronic valves.

53. The module of Claim 52, further comprising said control module being configured for recording at least one of a date and a time in association with actuation of at least one of said electronic valves.

54. The module of Claim 45, wherein at least one of said electronic valves is structured to be threadedly received into at least one of said assemblies.

55. A method of performing at least one fluid operation in a fluid system, said method comprising:

structuring a first check valve to permit fluid flow therethrough in response to application of positive pressure at an inlet of said first check valve, further structuring said first check valve with an outlet in fluid communication with a first portion of a fluid system;

structuring a second check valve having an outlet in fluid communication with said inlet of said first check valve, further structuring said second check valve to permit fluid flow therethrough in response to application of negative pressure at said outlet of said second check valve; and,

positioning an inlet/outlet port in fluid communication with said inlet of said first check valve and said outlet of said second check valve at a common refill/evacuation location.

56. The method of Claim 55, wherein said first portion of a fluid system includes at least a pre-filter portion.

57. The method of Claim 56, further comprising structuring said pre-filter portion of said fluid system for fluid communication with at least one fluid filter.

58. The method of Claim 55, further comprising positioning said second check valve in fluid communication with at least one fluid reservoir.

59. The method of Claim 55, further comprising operatively associating at least one quick disconnect with said inlet/outlet port.

60. The method of Claim 55, further comprising operatively associating at least one fluid component in fluid communication with said inlet/outlet port.

61. The method of Claim 55, further comprising applying positive pressure at said common refill/evacuation location.

62. The method of Claim 61, further comprising applying negative pressure at said common refill/evacuation location after said applying positive pressure at said common refill/evacuation location.

63. The method of Claim 61, further comprising performing at least one fluid refill operation by said applying positive pressure at said common refill/evacuation location.

64. The method of Claim 61, further comprising performing at least one filter purge operation by said applying positive pressure at said common refill/evacuation location.

65. The method of Claim 55, further comprising applying negative pressure at said common refill/evacuation location.

66. The method of Claim 65, further comprising applying positive pressure at said common refill/evacuation location after said applying negative pressure at said common refill/evacuation location.

67. The method of Claim 65, further comprising performing at least one fluid evacuation operation by said applying negative pressure at said common refill/evacuation location.

68. A method of performing a fluid operation, said method comprising:

structuring a first check valve to permit fluid flow therethrough in response to application of positive pressure at an inlet of said first check valve, further structuring said first check valve with an outlet in fluid communication with a portion of a fluid system;

structuring a second check valve having an outlet in fluid communication with said inlet of said first check valve, further structuring said second check valve to permit fluid flow therethrough in response to application of negative pressure at said outlet of said second check valve;

positioning an inlet/outlet port in fluid communication with said inlet of said first check valve and said outlet of said second check valve at a common refill/evacuation location;

applying positive pressure at said common refill/evacuation location to purge at least a pre-filter portion of said portion of a fluid system;

applying negative pressure at said common refill/evacuation location to evacuate fluid through said inlet/outlet port; and,

applying positive pressure at said common refill/evacuation location to refill at least one fluid through at least said portion of a fluid system.

69. The method of Claim 68, wherein said portion of a fluid system includes at least one fluid filter.

70. A power supply system structured for use in association with a machine for which at least one fluid service operation is performed, said system comprising:

a power receptacle positioned within the vicinity of an inlet/outlet port of a fluid system of said machine; and,

a power source supplying electrical power to said power receptacle, said power source being electrically operatively associated with a power source of said machine for which said fluid service operation is performed.

71. The power supply system of Claim 70, wherein said power source of said machine includes a battery.

72. The power supply system of Claim 70, further comprising at least one fluid component in fluid communication with said inlet/outlet port.

73. The power supply system of Claim 72, further comprising said power receptacle being structured for supplying electrical power to said fluid component.

74. A connection / disconnection detection system structured for use in association with at least first and second coupling portions of a fluid system of a machine, said detection system comprising:

a first electrical contact operatively associated with said first coupling portion;

a second electrical contact operatively associated with said second coupling portion; and,

a signal processor configured to receive electrical signals from said second electrical contact of said second coupling portion representative of association or disassociation of said first and second electrical contacts of said coupling portions.

75. The detection system of Claim 74, further comprising a control module operatively associated with said signal processor, said control module being configured to receive said representative electrical signal from said signal processor.

76. The detection system of Claim 75, further comprising said control module being further configured to record data in accordance with association of said first and second electrical contacts of said coupling portions.

77. The detection system of Claim 76, wherein said recorded data includes at least one of a date and a time of said association of said coupling portions.

78. The detection system of Claim 75, further comprising said control module being further configured to record data in accordance with disassociation of said first and second electrical contacts of said coupling portions.

79. The detection system of Claim 78, wherein said recorded data includes at least one of a date and a time of said disassociation of said coupling portions.

80. The detection system of Claim 74, wherein a power source of said signal processor is structured to receive electrical power from a power source of said machine.